NON-PUBLIC?: N
ACCESSION #: 9212210007
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Susquehanna Steam Electric Station - PAGE: 1 OF 03
Unit 1

DOCKET NUMBER: 05000387

TITLE: Reactor Scram When Main Turbine Tripped Due to Failed
Relay in Feedwater Hi Level Trip Logic
EVENT DATE: 11/12/92 LER #: 92-017-00 REPORT DATE: 12/14/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: T. S. Ryder - Power Production TELEPHONE: (717) 542-3235
Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: SJ COMPONENT: RLY MANUFACTURER: A109
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 1014 hours on November 12, 1992 with Unit 1 operating at 100% power, a reactor scram occurred when the Main Turbine tripped during surveillance testing on the Feedwater Control System. All major equipment operated per design during the transient, Emergency Core Cooling Systems (ECCS) were not challenged and no abnormal operator actions were required to place the unit in a stable condition
The reactor scram was caused by a
turbine control valve fast closure that resulted from a turbine master trip actuation. The turbine master trip was caused by a failed relay in the Feedwater C High Level Turbine Trip Channel coincident with surveillance testing of the Reactor Feedwater A High Level Turbine Trip channel. Root cause for the relay failure was attributed to a design misapplication problem. This event was determined to be reportable per

10CFR50.73(a)(2)(iv) in that an unplanned Engineered Safety Feature (ESF) actuation occurred when the RPS initiated an automatic reactor scram following turbine control valve fast closure with power greater than 24%. The plant was safely shut down and there were no safety consequences or compromise to public health or safety during this incident, nor would there have been under different initial operating conditions. The transient is within the bounds of a turbine trip as analyzed in Chapter 15 of the FSAR. The design misapplication problem was corrected and all of the Agastat relays associated with the Main Turbine and RFPT high water level trip logic were replaced on Unit 1. Following replacement of the relays, surveillance testing on the Feedwater Control System was successfully completed. It was verified that the design application for the Unit 2 comparable trip logic was acceptable.

END OF ABSTRACT

DESCRIPTION OF EVENT

At 1014 hours on November 12, 1992, with Unit 1 operating at 100% power, a Reactor Protection System (RPS, EIIS Code: JC) actuation occurred when the Main Turbine (EIIS Code: TA) tripped during surveillance testing on the Feedwater Control System (EIIS Code: SJ). Per design, the turbine control valves closed and an automatic reactor scram occurred. Both Reactor Recirculation (EIIS Code: AD) pumps tripped per design via the EOC-RPT logic circuitry. All control rods inserted fully. Two Safety Relief Valves (EIIS Code: SB) automatically lifted once to control reactor pressure and properly reseated. The immediate operator actions of EO-100-001, Reactor Scram, were performed. Reactor water level reached a low of just below -1 inch before recovering. Two of three Feedwater Heater (EIIS Code: SN) strings isolated. All major equipment operated per design during the transient, Emergency Core Cooling Systems (ECCS) were not challenged and no abnormal operator actions were required to place the unit in a stable condition.

CAUSE OF EVENT

The reactor scram was caused by a turbine control valve fast closure which resulted from a turbine master trip actuation. The turbine master trip was caused by a failed relay in the Feedwater C High Level Turbine Trip Channel coincident with surveillance testing of the Reactor Feedwater A High Level Turbine Trip channel. The failed relay, in combination with the surveillance testing, satisfied the two-out-of-three trip logic which resulted in the Main Turbine trip. The investigation determined that the relay contacts failed closed for the Main Turbine

trip logic and were open for the A Reactor Feed Pump Turbine (RFPT) trip logic. Therefore the A RFPT did not trip as a consequence of the relay failure.

Root cause for the relay failure was attributed to a design misapplication problem. The Agastat relay utilized an AC coil in a DC circuit. This resulted in accelerated thermal aging and subsequent failure. A review was conducted but could not determine the cause for originally utilizing an Agastat AC relay in a DC circuit.

REPORTABILITY/ANALYSIS

This event was determined to be reportable per 10CFR50.73(a)(2)(iv) in that an unplanned Engineered Safety Feature (ESF) actuation occurred when the RPS initiated an automatic reactor scram following turbine control valve fast closure with power greater than 24%. All major equipment operated per design during the transient, ECCS was not challenged and no abnormal operator actions were required to place the unit in a stable condition. The plant was safely shut down and there were no safety consequences or compromise to public health or safety during this incident, nor would there have been under different

initial operating conditions. The transient is within the bounds of a turbine trip as analyzed in chapter 15 of the FSAR.

In accordance with the guidance provided in NUREG 1022 Supplement 1 Item 14, the required submission date for this report was determined to be December 14, 1992.

CORRECTIVE ACTIONS

All of the Agastat relays associated with Main Turbine and RFPT high water level trip logic were replaced on Unit 1. The failed relay was replaced with an Agastat with a DC coil and appropriate drawing changes were made to reflect this. Following replacement of the relays, surveillance testing on the Feedwater Control System was successfully completed. It was verified that the design application for the Unit 2 comparable trip logic was acceptable in that the Unit 2 trip logic appropriately utilizes a DC coil in a DC circuit. All Agastat EGP series relays having a safety related function were reviewed with no misapplications identified. All other non-safety related Agastat EGP series relays with functions that have possible operational impact were reviewed. With the recent corrective actions for the Feedwater System, no additional misapplications exist. All remaining Agastat EGP series

relays which share coil power with relays having safety related or operational impact functions are being reviewed to identify and correct any misapplications which may exist. This review is expected to be completed by December 31, 1992.

The investigation of the cause of the Feedwater Heater (FWH) string isolations as part of this transient is still on-going. It is believed that the two strings isolated on high water level as sensed by the FWH level instrumentation when certain heaters in those strings flashed to steam. There was flashing in the third string also, but this was not enough to trip its isolation logic. FWH level instrumentation was checked for all three heater strings following the event. Minor problems were found and were corrected.

ADDITIONAL INFORMATION

Failed Component Identification:

Component: Relay, Power
Manufacturer: Agastat Relay Co.
Model: EGPI

Previous Similar Events:

There have been no previous LER's identified for either unit involving events initiated by the failure of a relay with an AC coil being utilized in a DC circuit.

ATTACHMENT 1 TO 9212210007 PAGE 1 OF 1

PP&L Pennsylvania Power & Light Company
Two North Ninth Street o Allentown, PA 18101 o 215 / 770-5151

December 14, 1992

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 92-017-00
FILE R41-2
PLAS - 552

Docket No. 50-387
License No. NPF-14

Attached is Licensee Event Report 92-017-00. This event was determined reportable per 10CFR50.73(a)(2)(iv) in that an unplanned Engineered Safety Feature actuation occurred when the Reactor Protection System initiated an automatic reactor scram following turbine control valve fast closure with power greater than 24%.

H.G. Stanley
Superintendent of Plant - Susquehanna

TSR/mjm

cc: Mr. T. T. Martin
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. G. S. Barber
Sr. Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 35
Berwick, PA 18603-0035

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